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Engineering Design File 1549

Staging, Storage, Sizing, and Treatment Facility (SSSTF)

Evaporation Pond Waste Acceptance Criteria (WAC) Basis & Aqueous Waste Management

[The following statement is optional: Prepared for: U.S. Department of Energy Idaho Operations Office Idaho Falls, Idaho]



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DISCLAIMER

It has been determined that the Evaporation Pond WAC will be completed by the Design/Build Subcontractor for the ICDF landfill and evaporation pond. The agency comments and this EDF will be provided to the Subcontractor. Therefore, no changes will be made to the EDF.

The agencies will have the opportunity to review the Evaporation Pond WAC when the ICDF documents have been submitted.

Approver/ Project Engineer

Requestor

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ACRONYMS

ALARA As Low As Reasonably Achievable

ARAR Applicable or Relevant and Appropriate Requirement

CAMU Corrective Action Management Unit

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act

CFR Code of Federal Regulations

COC contaminants of concern

DOE U.S. Department of Energy

EDF Engineering Design File

EP evaporation pond

EPA U.S. Environmental Protection Agency

FFA/CO Federal Facility Agreement and Consent Order

HWMA Idaho Hazardous Waste Management Act

ICDF INEEL CERCLA Disposal Facility

IDAPA Idaho Administrative Procedures Act

IDEQ Idaho Department of Environmental Quality

INEEL Idaho National Engineering and Environmental Laboratory

MEI maximally exposed individual

NOAA National Oceanic and Atmospheric Administration

NESHAP National Emission Standard for Hazardous Air Pollutant

OU Operable Unit

PCB Polychlorinated biphenyl

ppmw parts per million weight

PTC Permit to Construct

QA Quality Assurance

RD/RAWP Remedial Design, Remedial Action Work Plan

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RCRA Resource Conservation and Recovery Act

ROD Record of Decision

SSA Staging and Storage Annex

SSSTF Storage, Staging, Sizing, and Treatment Facility

TRU transuranic

TSCA Toxic Substance Control Act

VO Volatile Organic

WAC Waste Acceptance Criteria

WAG Waste Area Group

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Evaporation Pond Waste Acceptance Criteria (WAC) Basis & Aqueous Waste Management

1. INTRODUCTION

The U.S. Department of Energy Idaho Operations Office (DOE-ID) authorized a remedial design/remedial action (RD/RA) for the Idaho Nuclear Technology and Engineering Center (INTEC) in accordance with the Waste Area Group (WAG) 3, Operable Unit (OU) 3-13 Record of Decision (ROD)¹.

The ROD requires Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remediation wastes generated within the Idaho National Engineering and Environmental Laboratory (INEEL) boundaries to be removed and disposed of onsite in the INEEL CERCLA Disposal Facility (ICDF). The ICDF, which will be located south of INTEC and adjacent to the existing percolation ponds, will be an onsite, engineered facility, meeting Resource Conservation and Recovery Act (RCRA) Subtitle C, Idaho Hazardous Waste Management Act (HWMA), and polychlorinated biphenyl (PCB) landfill design and construction requirements. The ICDF will include the necessary subsystems and support facilities to provide a complete waste disposal system.

The major components of the ICDF are the disposal cells, an evaporation pond, and the Staging, Storage, Sizing, and Treatment Facility (SSSTF). The disposal cells, including a buffer zone, will cover approximately 40 acres, with a disposal capacity of about 510,000 cy. Current projections of INEEL-wide CERCLA waste volumes total about 483,800 cy. The SSSTF will be designed to provide centralized receiving, inspection, and treatment necessary to stage, store, and treat incoming waste from various INEEL CERCLA remediation sites prior to disposal in the ICDF, or shipment offsite. All SSSTF activities shall take place within the WAG 3 area of contamination (AOC) to allow flexibility in managing the consolidation and remediation of wastes without triggering Land Disposal Restrictions (LDRs) and other RCRA requirements, in accordance with the OU 3-13 ROD. Only low-level, mixed low-level, hazardous, and limited quantities of Toxic Substances Control Act (TSCA) wastes will be treated and/or disposed of at the ICDF. Most of the waste will be contaminated soil, but debris and Investigative Derived Waste (IDW) will also be included in the waste inventory. ICDF leachate, decontamination water and water from CERCLA well purging, sampling, and well development activities will also be disposed of in the ICDF evaporation pond.

Only INEEL onsite CERCLA wastes meeting the agency approved Waste Acceptance Criteria (WAC) will be accepted at the ICDF. An important objective of the WAC will be to ensure that hazardous substances disposed in the ICDF will not result in exceeding groundwater quality standards in the underlying groundwater aquifer. Acceptance criteria will include restrictions on contaminant concentrations based on groundwater modeling results with the goal of preventing potential future risk to the Snake River Plain Aquifer (SRPA).

The aqueous wastes are ICDF landfill leachate, secondary aqueous wastes generated from waste treatment processes and decontamination activities in the SSSTF and the INEEL WAGs. The EP is designated as a component of a Corrective Action Management Unit (CAMU) in the Operable Unit (OU) 3-13 Record of Decision (ROD).

1.1 Purpose and Assumptions

The purpose of this EDF is to provide the basis for the quantities of radioactive and RCRA COC that may be present in the aqueous wastes disposed of in the ICDF EP and the basis for its operation. The

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aqueous wastes identified at this time for disposal in the ICDF EP include aqueous wastes generated in the ICDF complex and CERCLA investigative, remedial and removal activities at the INEEL WAGs. The aqueous wastes will include leachate from the ICDF landfill, purge and development water from monitoring well drilling operations, and secondary aqueous wastes from waste processing and decontamination activities in the SSSTF and INEEL WAGs. Compliance with the requirements of the EP WAC will ensure protection of human health and the environment. This document defines responsibilities, identifies the waste acceptance process, and provides the regulatory citations to guide the development of the EP aqueous waste acceptance criteria. The regulatory bases for selecting the EP WAC limiting quantities of (organic and radioactive) contents EP are presented in Table 1-1 below:

Table 1-1. Limiting quantities of organic and radioactive COC in aqueous waste to the EP.

Contaminants of Concern	WAC Limit	Basis
Volatile Organics (total)		
	500 ppmw	IDAPA 58.01.05.008 (40 CFR 264.1082 through 1088)
COC Radionuclide Constituent	Will be developed based on NESHAPs modeling and included in 90 % design.	40 CFR 61.93 Facilities, Emission Monitoring and Emission Compliance

Initial NESHAPs modeling indicates that all waste in the design basis inventory are acceptable. This modeling was based on the waste inventory yearly projections expected into the ICDF landfill. Contributions to the modeled radioactive dose at the site boundary from the EP are negligible for the purge and development water in the inventory. Appendix A is a discussion of the initial NESHAPs modeling. The initial NESHAPs modeling uses earlier waste inventory numbers that have changed slightly since the initial NESHAPs modeling was done. The latest waste inventory will be used in a revised NESHAPs modeling that will be performed for the 90% design. The revised NESHAPs modeling is not expected to materially change the conclusions of the preliminary NESHAPs modeling.

To determine if wastes above and beyond the design basis inventory will cause the EP to exceed the 10 mrem/year dose at the site boundary the additional waste must be compared to the design basis inventory for the year it will be received. Waste that fall within the bounding design basis inventory for each year, and that have a similar distribution ratio of radionuclides are anticipated to be acceptable.

The following assumptions have been made during the development of this EDF (EDF-1549):

- 1. The design of the EP is not in the scope of the SSSTF project design. The EP design is part of the ICDF package. After the preliminary design of the EP is completed, it will be submitted for NESHAPs modeling.
- 2. NESHAPs modeling will establish the limits for the quantities of radionuclides that can be disposed of in the EP to ensure that the 10 mrem/yr requirement (40 CFR 61.92) is met.

Initial NESHAPs modeling indicates that all of the non-aqueous waste in the current Design Basis Inventory (EDF-1540)² can be placed in the ICDF landfill and all of the well purge/development water can be placed directly in the pond without causing the Evaporation Pond to exceed the 10 mrem/yr requirements.

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The operational mode of the EP, specifically the frequency with which the sludge in the EP will be cleaned out, will also impact the quantities of radioactive and RCRA COC that can be discharged to the EP. For purposes of this EDF it has been further assumed that the clean out of sludge from the EP will be performed as often as necessary to prevent the excessive build up of the RCRA COCs and radionuclides in the EP and thereby ensure environmentally compliant EP operation. The sludge removed from the EP will be disposed of in the ICDF landfill unit.

- 3. All aqueous wastes generated in the ICDF and the INEEL WAGs will be capable of being disposed of in the EP without treatment. This is based on the initial NESHAPs modeling of the expected radioactive contamination levels in the potential aqueous waste streams that will be generated in the ICDF landfill leachate and from the INEEL WAGs.
- 4. As part of a CERCLA remedial action, the EP is a component of a Corrective Action Management Unit (CAMU). Aqueous wastes generated within the ICDF Complex will be capable of being disposed of directly in the EP without the need for sampling. Information on the CAMU rule is provided in Section 4.1.2.1.
- 5. The EP will be ready for operation in 2003. Potentially contaminated wastewater generated before the EP becomes operational will be stored in holding tanks at the Staging and Storage Annex (SSA). The SSA will operate as a separate unit until the SSSTF become operational. At that time the SSA will administratively be included in the SSSTF.

1.2 Scope

The ICDF complex, including the EP, will be designed to DOE Order 435.1³, RCRA Subtitle C minimum technology requirements (40 CFR 264 subpart K requirements) and Toxic Substances Control Act (TSCA) specifications. The ICDF EP will be authorized to accept aqueous wastes generated within the ICDF complex and from CERCLA removal/remedial and investigative activities at the INEEL WAGs. Based on the inventory in EDF 1540, the aqueous wastes generated within the ICDF complex, and the aqueous wastes generated during CERCLA removal/remedial and investigative activities at the INEEL WAGs are expected to contain radionuclides and RCRA COCs in quantities considerably below the maximum limits of the WAC.

2. RESPONSIBILITIES

2.1 Evaporation Pond Management and Operations

A selected contractor will be responsible for managing and operating the ICDF complex including the EP. The operational contracting mechanisms and responsibilities of the contractor will be decided in the future. The U.S. Environmental Protection Agency (EPA) and the Idaho Department of Environmental Quality (IDEQ) will provide oversight during design and construction of the ICDF complex. WAG 3 will be responsible for performing activities related to the EP in accordance with the EP WAC and other WAC documents for the ICDF landfill and the SSSTF. A system of checks and balances will be in place to ensure the appropriate level of coordination exists among those operating and using the ICDF complex. This system of checks and balances will protect the EP from being out of compliance with applicable regulations. A general description of the system as it relates to the EP is presented below and will be formalized when the operating procedures for the EP are developed as part of the ICDF Remedial Design/ Remedial Action Work Plan (RD/RAWP).

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The EP management and operations team will include the selected organizations assigned to operate the ICDF complex. These personnel will be responsible for:

- Maintaining the WAC document for the EP
- Review and approval/rejection of requests for disposal of aqueous wastes based on health and safety, the waste acceptance documents, and current environmental regulations
- Maintaining a proactive quality assurance (QA) program for timely identification of deficiencies and implementation of appropriate corrective actions, including verification procedures to ensure that incoming wastes meet the EP WAC.

2.2 Evaporation Pond Users

The EP will accept aqueous wastes from the ICDF complex and performers of CERCLA remedial/removal and investigative actions at WAG 3 and other INEEL WAGs. These aqueous wastes include:

- ICDF landfill leachate
- Aqueous wastes generated in the ICDF complex and from CERCLA investigative, remedial and removal activities at the INEEL WAGs
- Secondary aqueous wastes from waste processing and decontamination activities in the SSSTF and INEEL WAGs
- Purge and development water from monitoring wells.

The users of the EP will be required to:

- Participate in planning discussions and submit long-term operational project schedules that involve EP pond usage
- Develop, document, and implement appropriate waste sampling and analysis plans when required for development of waste profiles (see Appendix B).
- Prepare aqueous waste profiles, designate the aqueous waste, and obtain EP management
 acceptance for each aqueous waste source or group of aqueous waste sources, for
 aqueous waste that will be disposed of in the EP
- For waste not in the design basis inventory, compare the new waste with the NESHAPs modeling for the EP, and determine if the new waste is within the design basis bounding inventory.
- Obtain and or confirm EP management's authorization for disposal of the aqueous waste in the EP
- Transport approved aqueous wastes to the SSSTF.

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3. WASTE ACCEPTANCE PROCESS

3.1 Planning

3.1.1 Waste Streams and Volumes

The aqueous wastes that will be generated at the ICDF and the INEEL WAGs are as follows:

- ICDF landfill leachate. The design and operation of the ICDF landfill will include provisions for leachate monitoring and management. The leachate collection rate will be monitored and the leachate will be sampled initially and annually to estimate cumulative radionuclide discharges to the EP, and to monitor landfill performance. The leachate will be disposed of in the EP with no treatment. The quantity of leachate will vary with the rate of precipitation and the uncovered surface area of the ICDF landfill. Calculations of leachate generation volumes will be a part of the ICDF/EP design.
- Aqueous wastes generated in the ICDF complex and from CERCLA investigative, remedial and removal activities at the INEEL WAGs. The aqueous wastes generated inside the ICDF will be capable of being sent to the EP directly, as long as their COC content can be estimated. The aqueous wastes generated outside the ICDF will be sampled and a waste profile completed by the waste generator prior to the waste being shipped to the SSSTF for disposal in the EP. The waste profile will indicate if the aqueous waste can be accepted into the EP without treatment. Aqueous waste that cannot be accepted into the EP without treatment will be evaluated for use as make-up water in the stabilization process at the SSSTF. All of the waste in the current design basis inventory can be accepted into the EP without treatment.
- Secondary aqueous wastes from waste processing and decontamination activities inside the SSSTF and ICDF Complex. Generation and handling issues for the secondary wastes from treatment processes will be addressed during development of the waste treatment processes. The quantity of aqueous waste generated from decontamination activities is expected to be minimal. All secondary aqueous wastes generated will be capable of being disposed of in the EP without treatment. The quantities of secondary waste generated cannot be estimated at this time.
- Purge and development water from monitoring wells. It is estimated that 262,450 gal of monitoring well purge and development water will be generated prior to the middle of the year 2003 when the EP is expected to become operational. This water will be stored in tanks at the SSA until the EP is ready to accept it. After the EP becomes operational, the peak purge and development water generation rate is estimated to be 34,800 gal/year. The purge water will be sampled and profiled prior to disposal in the ICDF EP. The projected inventory of purge and development water can be accepted into the EP without treatment.

3.1.2 Long-term Scheduling

As mentioned in Section 2.2, the EP users will be tasked with participating in planning discussions and submitting long-term operational project schedules.

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3.1.3 Operational Scheduling

The management and operational team of the EP will perform operational scheduling. The scheduling of wastes for disposal to the pond will be performed based on a prioritization of wastes for disposal, and upon keeping the liquid level in the pond within the design requirements. Since trucks delivering aqueous wastes to the ICDF EP will be logged in through the SSSTF, scheduling of the truck delivered aqueous waste receipts will need to be coordinated with the nonaqueous waste receipts into the SSSTF. See EDF-1547, Staging Storage, Sizing, and Treatment Facility (SSSTF) Operational Scenarios and Process Flows⁴.

3.2 Waste Certification

Waste certification is a combination of waste designation, characterization, and verification that records of quantities of radioactive and RCRA COC disposed of in the EP are maintained.

3.2.1 Waste Profile/Designation

<u>ICDF Complex aqueous wastes:</u> The ICDF management and operating personnel will be responsible for preparing the waste profile sheets and designating the wastes that are generated inside the ICDF complex. These waste profile sheets will be updated periodically to indicate the volume of waste sent to the EP, and to document any process changes that may change the character of the waste.

Non-ICDF Complex wastes: The generating WAGs or projects must complete a waste profile sheet for wastes to be stored at the SSA/SSSTF. The initial aqueous waste stored at the SSA will have analytical data available before the EP is operational. Subsequent aqueous waste from the same sources (purge water from the same wells, for example) will be accepted with a new waste profile sheet that can be prepared on the basis of the initial waste profile. Aqueous waste from new waste sources must be accompanied by a waste profile with analytical data or sufficient process knowledge to show that the waste meets the EP WAC

3.2.2 Verification

The management and operational team of the EP will be responsible for verifying the aqueous waste input data supplied by the waste generators before the waste is delivered to the ICDF for disposal in the EP.

3.3 Waste Delivery

3.3.1 ICDF Leachate

The ICDF leachate will be pumped to the EP from the leachate collection sump.

3.3.2 Other Wastes

The monitoring well purge and development water will be delivered in tanker trucks or 55-gal drums. The decontamination water will be collected in a lift station and pumped to the EP by pressure pipeline. As an option, tanker trucks could be used to transfer the wastewater to the EP.

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3.3.3 Shipping Documentation

Shipping documentation will be provided by the EP users and maintained in files by the EP management and operational team.

3.3.4 Noncompliant Waste

Non-compliant waste is aqueous waste that cannot be disposed of in the EP. Non-compliant waste is not expected to be generated at the ICDF and INEEL WAGs. Non-compliant aqueous waste will not be accepted for disposal at the EP if it is generated outside the ICDF complex. The aqueous waste may be accepted at the SSSTF for treatment in the SSSTF stabilization process to meet the ICDF landfill WAC. Any ICDF complex-generated waste that does not meet the EP WAC will be treated at the SSSTF for disposal in the ICDF landfill.

4. WASTE ACCEPTANCE BASIS

4.1 Criteria Basis

The basis for acceptance criteria includes protection of human health (including worker health and safety), compliance with Applicable or Relevant and Applicable Requirements (ARARs) per the OU 3-13 ROD to protect human health and the environment, compliance with applicable DOE orders, and best management practices.

4.1.1 Protection of Human Health and the Environment

Occupational exposure for radiological and chemical contaminants will be maintained as low as reasonably achievable (ALARA). During the construction phase of this project, workers shall be in compliance with approved design documents, a site-specific health and safety plan, and other requirements of the INEEL Subcontractor Manual⁵ and 29 CFR 1926. During the operational phase, operating procedures developed for the evaporation pond will be followed. The operational procedures will protect the environment by complying with environmental regulations called out in the OU 3-13 ROD as ARARs.

4.1.2 Compliance with ARARs

The pond will be designed and operated in compliance with the ARARs. The majority of ARARs fall into broad categories that relate to design and operation, release detection, and monitoring. For example, the regulations in 40 Code of Federal Regulations (CFR) Subpart K, 264.221 Surface impoundment design and operating requirements will be used as a basis for design requirements for the EP. This regulation also will be the basis for the pond operating procedures, including inspection frequency and pond operating levels.

ARARs that affect the WAC are those that limit what types of waste and what concentrations/activities of contaminants are allowed to enter the pond. These ARARs are discussed below.

4.1.2.1 The Corrective Action Management (CAMU) rule has the most effect on the WAC. The EP is designated as a component of a CAMU unit in the OU 3-13 ROD. The definition of a CAMU is found in 40 CFR 260.10: "CAMU means an area within a facility that is used only for managing remediation wastes for implementing corrective action or cleanup at the facility." For purposes of this

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EDF, the INEEL is considered "the facility". Subpart S of 40 CFR 264 specifically provides for Corrective Action for Solid Waste Management Units or CAMU in 40 CFR 264.552(a):

To implement remedies under 264.101 or RCRA 3008 (h) or to implement remedies at a permitted facility that is not subject to 264.101, the Regional Administrator may designate an area at the facility as a corrective action management unit, as defined in 260.10, under the requirements in this section. A CAMU must be located within the contiguous property under the control of the owner/operator where the wastes to be managed in the CAMU originated. One or more CAMUs may be designated at a facility.

- (1) Placement of remediation waste into or within a CAMU does not constitute land disposal of hazardous wastes.
- (2) Consolidation or placement of remediation wastes into or within a CAMU does not constitute creation of a unit subject to minimum technology requirements.
- **4.1.2.2** IDAPA 58.01.05.008 (40 CFR 264.221(c)(2)) gives specific requirements for a leachate collection and removal system below the impoundment, including 264.221.(c)(2)(iii) "Constructed of materials that are chemically resistant to the waste managed in the surface impoundment and the leachate expected to be generated. . ." This compatibility requirement means that wastes which may harm the liner due to the nature of their chemical composition will not be accepted for disposal to the pond. The compatibility requirements will drive the allowable concentrations in the WAC unless some other requirement is more restrictive.
- 4.1.2.3 IDAPA 58.01.05.008 (40 CFR 264, Subpart BB) Air Emissions Standards for Equipment Leaks. These standards apply to equipment that contains or contacts hazardous wastes with organic concentrations of at least 10% by weight. The standards are for specific pieces of equipment (e.g., pumps, compressors, pressure relief valves). Because the soils coming in to the ICDF Landfill have concentrations below the alternative LDR treatment standards for contaminated soils (IDAPA 58.01.05.011[40 CFR 268.49]), leachate from the ICDF Landfill is expected to have organic constituent concentrations below LDRs. No waste streams are envisioned that will be near 1% organic concentrations. Hence, the 10% organic by weight is selected as the EP WAC limit per RCRA regulation.

4.1.2.4 IDAPA 58.01.05.008 (40 CFR 264, Subpart CC) Air Emission Standards for Tanks, Surface Impoundments, and Containers.

40 CFR 264.1082(c)(1) provides:

(1) A tank, surface impoundment, or container for which all hazardous waste entering the unit has an average volatile organic (VO) concentration at the point of waste origination of less than 500 parts per million by weight (ppmw). The average VO concentration shall be determined using the procedures in 264.1083 (a) of this subpart. The owner or operator shall review and update, as necessary, this determination at least once every 12 months following the date of the initial determination for the hazardous waste streams entering the unit.

Also, the entire Subpart CC Air Emission Standards for Tanks, Surface Impoundments, and Containers (IDAPA 58.01.05.008 [40 CFR 264.1080 through 1090]) has a specific exemption for remedial actions under CERCLA.

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- "40 CFR 264.1080 (b) The requirements of this subpart do not apply to the following waste management units at the facility: (5) A waste management unit that is sole for on-site treatment or storage of hazardous waste that is placed in the unit as a result of implementing remedial activities required under the corrective action authorities of RCRA sections 3004 (u), 3004 (v), or 30008 (h); CERCLA authorities; or similar Federal or State Authorities."
- 40 CFR 61.92 National Emission Standards for Hazardous Air Pollutants (NESHAPs) for radionuclides from DOE. This regulation states that "Emissions of radionuclides to the ambient air from Department of Energy facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr."
- 40 CFR 61.93 Facilities, Emission Monitoring and Emission Compliance. This regulation specifies how compliance with 40 CFR 61.92 is demonstrated. The allowable level of radionuclides in incoming aqueous waste will be determined based on modeling and reverse calculation of the allowable activities in the waste. Demonstration of meeting the 10 mrem/yr requirement will be done by modeling of projected radiological emissions from the pond, similar to the approach used for the Test Reactor Area (TRA) EP. Modeling will be performed as soon as all parameters are available.

5. CONCLUSIONS

The EP will accept ICDF landfill leachate and other potentially contaminated aqueous waste streams generated within the ICDF and INEEL WAGs without treatment. There are currently no aqueous wastes in the design basis inventory that will require treatment in the SSSTF prior to disposal in the EP. In the unlikely event that aqueous waste that do not meet the EP WAC are generated, these wastes will be treated at the SSSTF as stabilization make up water for disposal at the ICDF landfill.

6. REFERENCES

- 1. DOE-ID 1999, Final Record of Decision, Idaho Nuclear Technology and Engineering Center, U.S. Department of Energy Idaho Operations Office, DOE/ID-10660, Revision 0, October 1999.
- 2. EDF-1540, "Staging Storage, Sizing, and Treatment Facility (SSSTF) Waste Inventory Design Basis".
- 3. DOE Order 435.1, Radioactive Waste Management, Rev. 0, July 9, 1999.
- 4. EDF-1547, "Staging Storage, Sizing, and Treatment Facility (SSSTF) Operational Scenarios and Process Flows"
- 5. PDD-1001 Subcontractor Requirement Program Description Rev. 05, June 20, 2000.